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About the Cover:

Family vehicles in the U.S. consume enough fuel each year to cover a regulation-size football field to a depth of about 40 miles. FETC partners with industry and other organizations to develop and deploy ultra-clean, high-performance fuels, ensuring that we can continue to depend on our transportation-based economy to bolster our transportation-based lifestyle.



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Alternatives to Gasoline Today

Remember those long lines at gas stations in 1973 during the energy crisis, and why the crisis occurred? We need our cars, and we have to have gasoline to run them, right? Not necessarily!

You don't have to use gasoline to run your vehicle. You can buy a vehicle that runs on another fuel, such as compressed natural gas, or have your car converted to use other fuels. Alternative fuels are often cleaner and cheaper. And since alternative fuels are domestically produced, we don't have to rely on foreign imports for an adequate supply.

Alternative fuels are "substantially non-petroleum" and "yield substantial energy security benefits and substantial environmental benefits." (Energy Policy Act of 1992) The major alternative fuels available for vehicles today are compressed natural gas

(CNG), liquefied natural gas (LNG), ethanol, liquefied petroleum gas (LPG), methanol, and electricity. All these fuels reduce ozone-forming tailpipe emissions (carbon monoxide and nitrogen oxides), and the reductions compared to gasoline range from 25 percent less for ethanol to 80 percent less for CNG.

Alternative-fuel vehicles (AFVs) are offered by the three major U.S. automobile manufacturers in addition to Honda, Toyota, and Volvo: cars, trucks and vans powered by CNG, methanol, ethanol, LPG, and electricity. You can also have your favorite vehicle converted to alternate fuels. Manufacturers of conversion systems provide warranties for the alternative-fuel components.



Alternative Fuels In Action

Clean Cities Program—DOE's Office of Energy Efficiency and Renewable Energy established the Clean Cities Program in 1993 to encourage the use of AFVs. The Clean Cities Program assists interested parties in finding funding sources, including incentives and tax breaks. The federal government offers income tax deductions for purchase of AFVs, many states have incentives, and some private companies offer rebates or discounts. Most incentives are only available in certain states or areas, and many

of the private company incentives apply only to people in that company's service area. For example, the State of West Virginia offers a substantial tax credit for individuals and companies who purchase new AFVs or convert their existing vehicles to natural gas. And Pennsylvania State Energy Office Incentive Grants pay a percentage of expenses for converting vehicles to alternative fuels, purchasing a new AFV, and for costs to install fueling equipment.

The Clean Cities Program is a voluntary, locally based, govern-

ment and industry partnership that mobilizes local stakeholders to expand the use of alternatives to gasoline and diesel fuels, accelerate the deployment of AFVs, and build a local AFV refueling infrastructure.

More than 70 Clean Cities partnerships have been created across the country, and the program is still growing. The first Clean Cities partnership was designated in Atlanta, Georgia, in September 1993. FETC is an active stakeholder in the Pittsburgh Region Clean City Coalition, designated in December 1995, and in the West Virginia Clean State Coalition, designated in October 1994. A statewide Clean Cities status was awarded to West Virginia because of the availability of public-access CNG fueling stations throughout the state.

Help on Getting Started—The Clean Cities web site (www.ccities.doe.gov) answers questions on funding, alternative fuels and AFVs, program planning, and other program issues; gives easy to understand instructions on how to join the Clean Cities Program; and offers a step-by-step process to help fleet managers make informed AFV purchase decisions. Eight Regional Support Offices throughout the U.S. assist local Clean Cities coalitions with their alternative fuel market development efforts.

I-79 Corridor Project—In 1998, FETC began working with the West Virginia Clean State Coalition and the Pittsburgh Region Clean City Coalition on the I-79 Corridor Project—promoting the use of CNG as a



Characteristics of Alternative Fuels

	Compressed Natural Gas (CNG) (gas at 3000 psi)	Liquefied Natural Gas (LNG) (liquid)	Ethanol (E85) (liquid)	Methanol (M85) (liquid)	Liquefied Petroleum Gas (LPG) (liquid)
Primary Components	methane	methane that is cooled cryogenically	denatured ethanol and gasoline	methanol and gasoline	propane
Main Fuel Source	underground reservoirs	underground reservoirs	corn, grains, or agricultural waste	natural gas, coal or woody biomass	by-product of petroleum refining or natural processing
Energy per Gallon (gasoline = 124,800)	29,000 Btu	73,500 Btu	105,545 Btu	65,350 Btu	84,000 Btu
Octane Rating (gasoline = 86-94)	104	104	100	100	108
Ozone-Forming Emissions Compared to Gasoline	80% less	80% less	25% less	40% less	60% less

transportation fuel along the 220-mile stretch of I-79 between Charleston, West Virginia, and Pittsburgh, Pennsylvania. Partners in the I-79 Corridor Project led by the West Virginia Development Office include FETC, West Virginia University, Equitable Gas Company in Pennsylvania and West Virginia, Hope Gas Incorporated in West Virginia, and O'Green Compressor Corporation in Eugene, Oregon.

Two new CNG stations will be established through this project. These stations will feature an innovative hydraulic compressor technology. The *Alternative Fuel Vehicle Refueling & Maintenance Directory*, 1998-99 edition (published by the Clean Cities Program) for the Mid-Atlantic region provides lists and maps of CNG refueling stations and

maintenance/repair facilities by state. Indeed, about 20 to 25 CNG stations already exist all along the I-79 corridor, and about 15 of these are right off the interstate. This stretch of interstate leads the Nation in CNG refueling stations per mile.

FETC recently facilitated Clean Cities workshops in Pennsylvania and West Virginia, and about 90 people attended each workshop. The workshops focused on natural gas vehicles and included discussion of available local, state, and federal grants and tax

In 1993, the Postal Service received the Natural Gas Vehicle Coalition Achievement Award for outstanding advancement of natural gas as vehicular fuel. Today, the U.S. Postal Service CNG fleet of 7,325 LLVs (long-life vehicles) is located in 27 states and Washington, D.C.

incentives. Major automobile manufactures, like Chrysler, Ford, Honda, and General Motors, unveiled their latest natural gas vehicle designs and displayed their latest AFVs. Local fleet owners presented success stories, and experts offered one-on-one assistance to fleet managers and others interested in getting started on the move to AFVs.

During the West Virginia workshop, FETC was recognized for our efforts in the I-79 Corridor Project, and the project was selected as West Virginia's outstanding energy efficiency project in the 1999 Mid-Atlantic State Energy Program.

Advantages of Compressed Natural Gas

CNG is natural gas that is stored in compressed form at pressures of 2,400 to 3,600 pounds per square inch (psi) in a high-pressure fuel tank. The fuel can be used in light- or heavy-duty vehicles. CNG fuel tanks are made of 1/2 inch to 3/4 inch thick aluminum or steel that is overwrapped with fiber.

Most of us are familiar with gasoline, so we rarely question its safety—even though we know it's



quite explosive. Because we are unaccustomed to alternative fuels like CNG, we may have misconceptions or doubts about the safety of these fuels. In the event of a leak, CNG is lighter than air so it dissipates quickly into the atmosphere, rather than forming hazardous pools as liquid fuels do. CNG ignites at a much higher temperature than gasoline, making inadvertent ignition less likely. The fuel-tank cylinders have been shown to be much safer than conventional gasoline tanks, which are made of thin sheet metal. However, since CNG is gas under pressure, if a tank should rupture, the spread of fuel and flames would be almost instantaneous.

Because CNG burns so cleanly, spark plugs and lubricants require fewer changes, and tune-ups aren't needed as often. Engines burning natural gas may last two or three times longer than those burning gasoline. CNG produces only a fraction of the overall pollutants found in the emissions of gasoline vehicles—and virtually no carbon monoxide, no sulfur oxides, and no particulate matter when the engines are tuned and maintained properly.




Cooperating for Cleaner Air

No population relies more on the automobile to get from point to point than people in the U.S. The transportation sector has an enormous impact on our economy, our national energy security, and our environment. Close to one-quarter of all American energy consumption is related to transportation. Today, over half of our oil is imported. Alternative fuels, on the other hand, are principally domestic products. Emissions from vehicles are the single largest contributor to air pollution in many cities, making our air unhealthy to breathe and increasing our health care costs. CNG is probably the cleanest of the currently available alternative fuels. For example, ozone-forming emissions are 80 percent lower than for gasoline.

Alternative fuels and AFVs benefit both local and national economies by creating new jobs and commercial opportunities. Activities such as AFV conversions, new technology development, and greater use of domestically produced fuels and feedstocks all generate business growth and new profit opportunities. As pledges to make AFV acquisitions through the year 2005 are made, DOE is working to transform these pledges into firm vehicle purchases or conversion orders, while challenging manufacturers to develop product lines that meet the various needs of the market.

The partnerships are built on the premise that we can change our communities for the better through cooperation and voluntary partnerships, working to

reduce our reliance on imported oil, and improving air quality. We can work together to effect change and to expand the use of domestic alternative fuels. 

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Legislative Action on Emissions

The Clean Air Act Amendments (CAAA) of 1990 were passed to improve air quality in the U.S. and to create initiatives that reinforce the reduction of mobile source pollutants. Air quality in metropolitan areas is measured in comparison to the National Ambient Air Quality Standards (NAAQS). Areas that exceed standards for these pollutants are classified as non-attainment areas. Part of the CAAA requires fleet operators of ten or more automobiles or light duty trucks capable of central fueling and located in non-attainment areas to begin purchasing clean-fuel vehicles by 1998.

The Energy Policy Act of 1992 (EPAct) was passed to establish a firm energy policy for the U.S., and to reduce America's dependence on foreign oil. A significant portion of EPAct deals with alternative fuels, requiring their use in certain fleets located in metropolitan areas.